FIG. 1

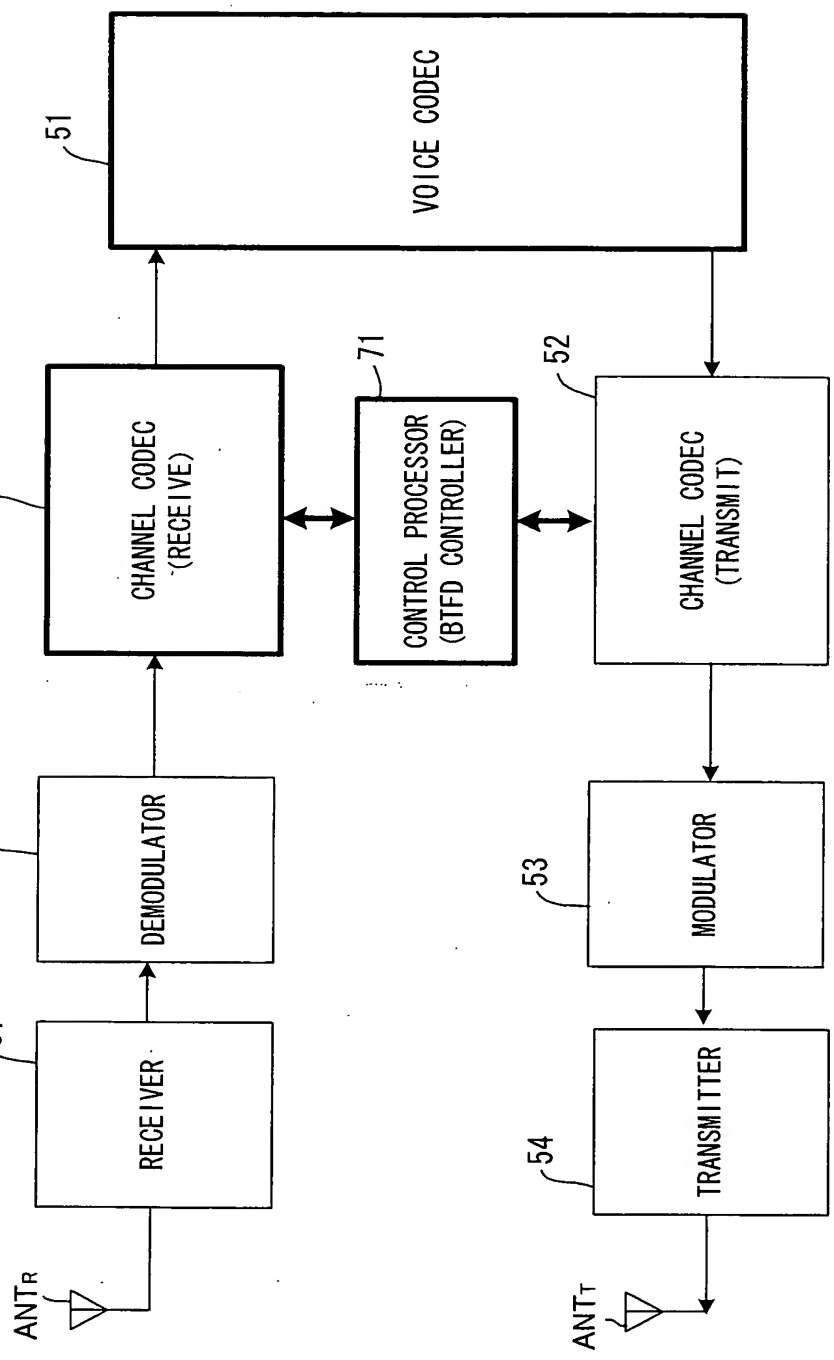

51
VOICE CODEC
63
CHANNEL CODEC (RECEIVE)
71
CONTROL PROCESSOR (BTFD CONTROLLER)
52
CHANNEL CODEC (TRANSMIT)
62
DEMODULATOR
53
MODULATOR
61
RECEIVER
54
TRANSMITTER
ANTR
ANTT

FIG. 2

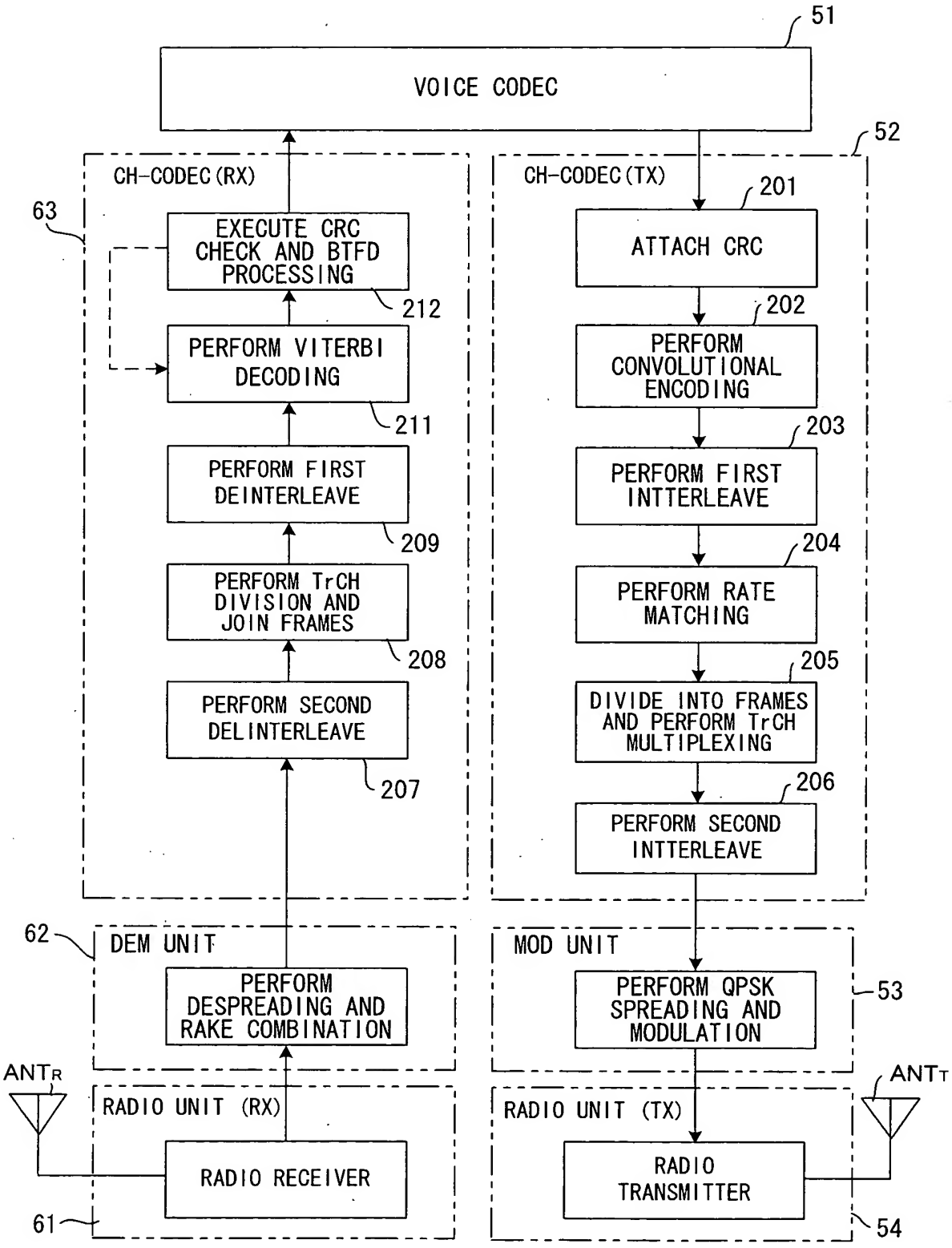

51
VOICE CODEC
52
CH-CODEC(RX)
63
EXECUTE CRC CHECK AND BTFD PROCESSING
212
PERFORM VITERBI DECODING
211
PERFORM FIRST DEINTERLEAVE
209
PERFORM TrCH DIVISION AND JOIN FRAMES
208
PERFORM SECOND DELINTERLEAVE
207
CH-CODEC(TX)
201
ATTACH CRC
202
PERFORM CONVOLUTIONAL ENCODING
203
PERFORM FIRST INTTERLEAVE
204
PERFORM RATE MATCHING
205
DIVIDE INTO FRAMES AND PERFORM TrCH MULTIPLEXING
206
PERFORM SECOND INTTERLEAVE
62
DEM UNIT
PERFORM DESPREADING AND RAKE COMBINATION
MOD UNIT
PERFORM QPSK SPREADING AND MODULATION
53
ANTR
RADIO UNIT (RX)
RADIO RECEIVER
61
RADIO UNIT (TX)
RADIO TRANSMITTER
54
ANTT

FIG. 3

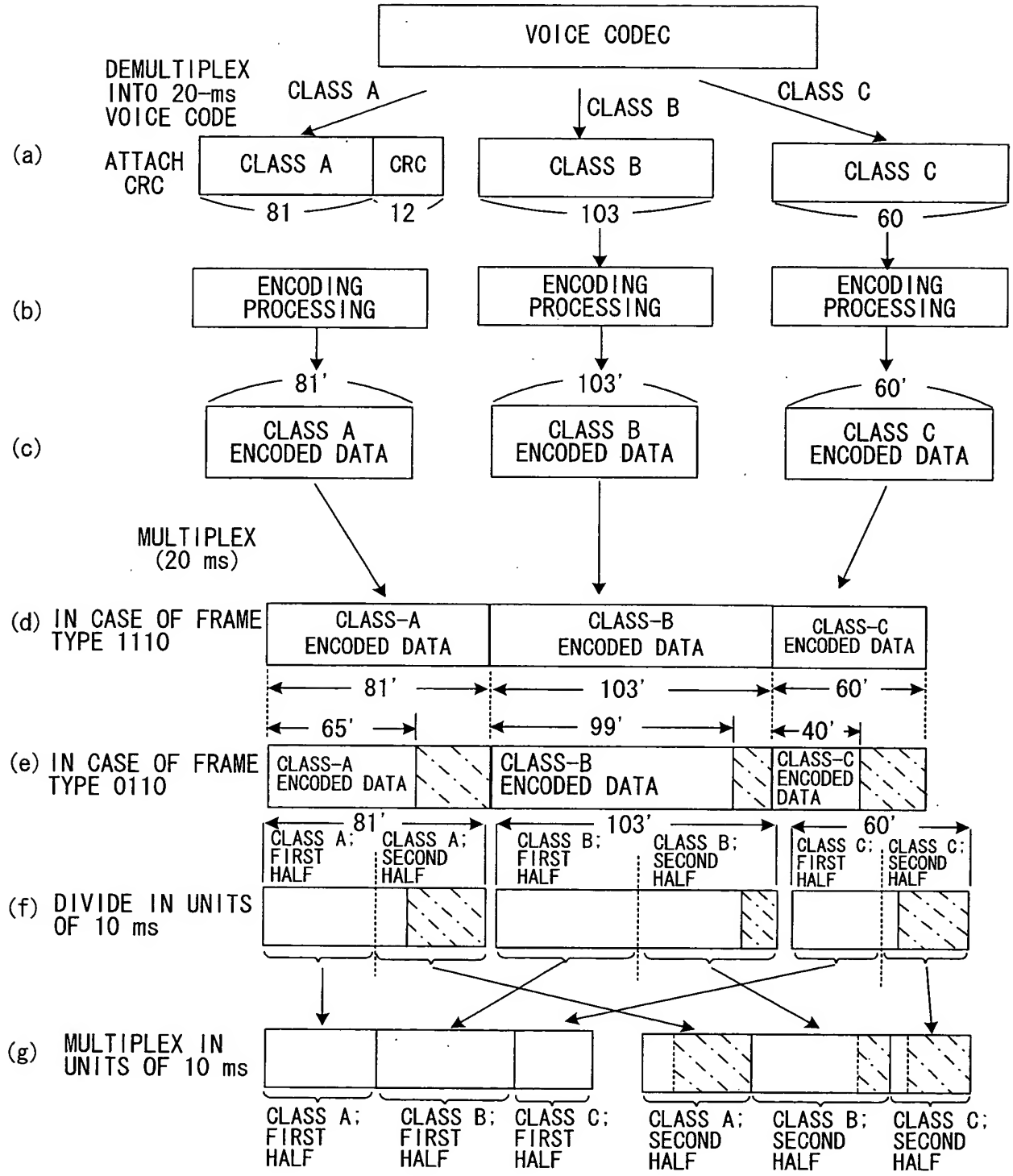

VOICE CODEC
DEMULTIPLEX INTO 20-ms VOICE CODE
CLASS A
CLASS B
CLASS C
(a)
ATTACH CRC
CLASS A
CRC
CLASS B
CLASS C
81
12
103
60
(b)
ENCODING PROCESSING
ENCODING PROCESSING
ENCODING PROCESSING
81'
103'
60'
(c)
CLASS A ENCODED DATA
CLASS B ENCODED DATA
CLASS C ENCODED DATA
MULTIPLEX (20 ms)
(d) IN CASE OF FRAME TYPE 1110
CLASS-A ENCODED DATA
CLASS-B ENCODED DATA
CLASS-C ENCODED DATA
81'
103'
60'
65'
99'
40'
(e) IN CASE OF FRAME TYPE 0110
CLASS-A ENCODED DATA
CLASS-B ENCODED DATA
CLASS-C ENCODED DATA
81'
103'
60'
(f) DIVIDE IN UNITS OF 10 ms
CLASS A; FIRST HALF
CLASS A; SECOND HALF
CLASS B; FIRST HALF
CLASS B; SECOND HALF
CLASS C; FIRST HALF
CLASS C; SECOND HALF
(g) MULTIPLEX IN UNITS OF 10 ms
CLASS A; FIRST HALF
CLASS B; FIRST HALF
CLASS C; FIRST HALF
CLASS A; SECOND HALF
CLASS B; SECOND HALF
CLASS C; SECOND HALF

FIG. 4

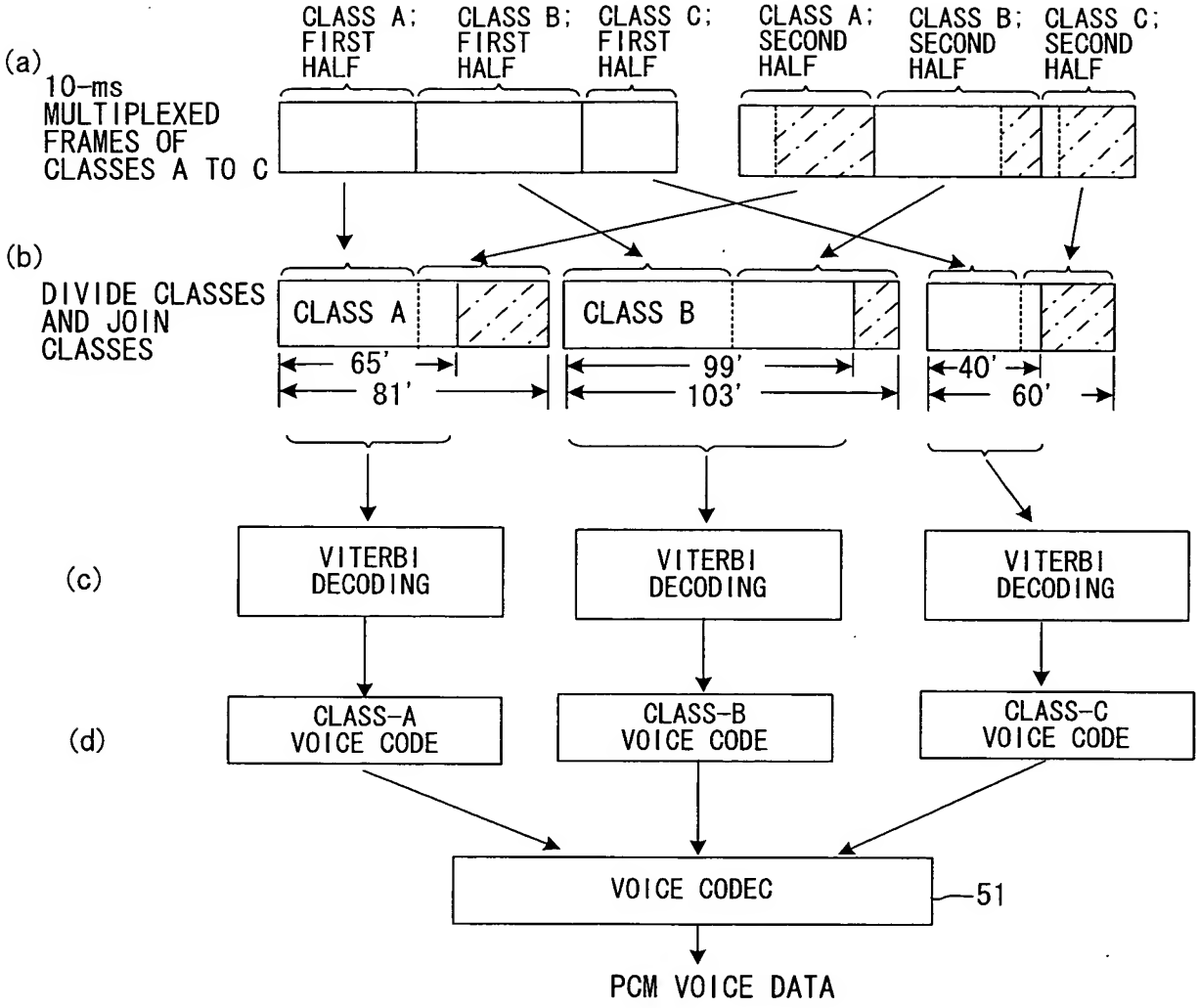

(a)
10-ms MULTIPLEXED FRAMES OF CLASSES A TO C
CLASS A; FIRST HALF
CLASS B; FIRST HALF
CLASS C; FIRST HALF
CLASS A; SECOND HALF
CLASS B; SECOND HALF
CLASS C; SECOND HALF
(b)
DIVIDE CLASSES AND JOIN CLASSES
CLASS A
CLASS B
65'
81'
99'
103'
40'
60'
(c)
VITERBI DECODING
VITERBI DECODING
VITERBI DECODING
(d)
CLASS-A VOICE CODE
CLASS-B VOICE CODE
CLASS-C VOICE CODE
VOICE CODEC
51
PCM VOICE DATA

FIG. 5

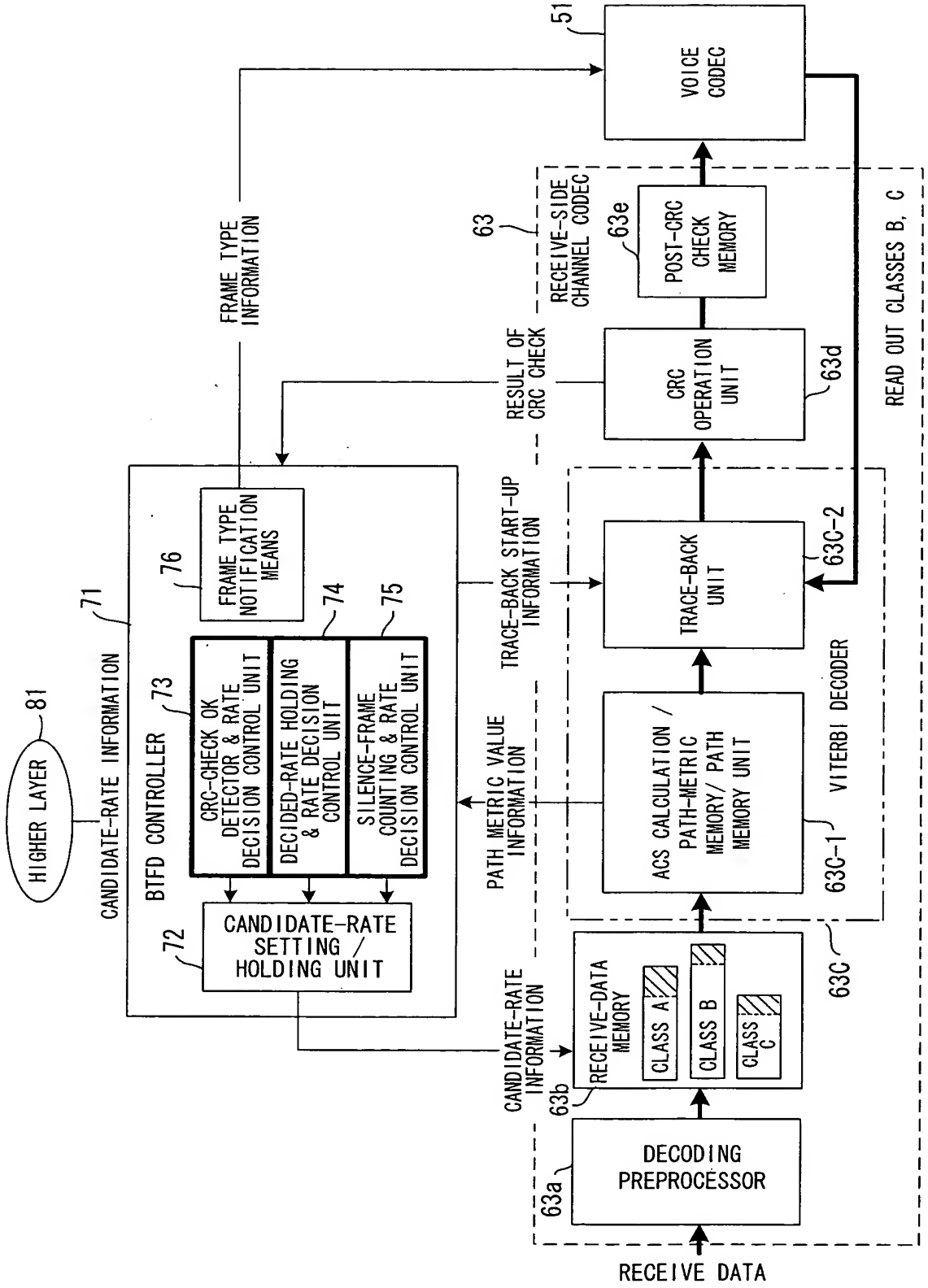

HIGHER LAYER
81
CANDIDATE-RATE INFORMATION
BTFD CONTROLLER
71
CRC-CHECK OK DETECTOR & RATE DECISION CONTROL UNIT
73
DECIDED-RATE HOLDING & RATE DECISION CONTROL UNIT
74
SILENCE-FRAME COUNTING & RATE DECISION CONTROL UNIT
75
FRAME TYPE NOTIFICATION MEANS
76
CANDIDATE-RATE SETTING / HOLDING UNIT
72
FRAME TYPE INFORMATION
TRACE-BACK START-UP INFORMATION
PATH METRIC VALUE INFORMATION
CANDIDATE-RATE INFORMATION
RESULT OF CRC CHECK
63
RECEIVE-SIDE CHANNEL CODEC
VOICE CODEC
51
POST-CRC CHECK MEMORY
63e
CRC OPERATION UNIT
63d
TRACE-BACK UNIT
63C-2
ACS CALCULATION / PATH-METRIC MEMORY/ PATH MEMORY UNIT
63C-1
VITERBI DECODER
RECEIVE-DATA MEMORY
63b
CLASS A
CLASS B
CLASS C
63C
DECODING PREPROCESSOR
63a
READ OUT CLASSES B, C
RECEIVE DATA

FIG. 6

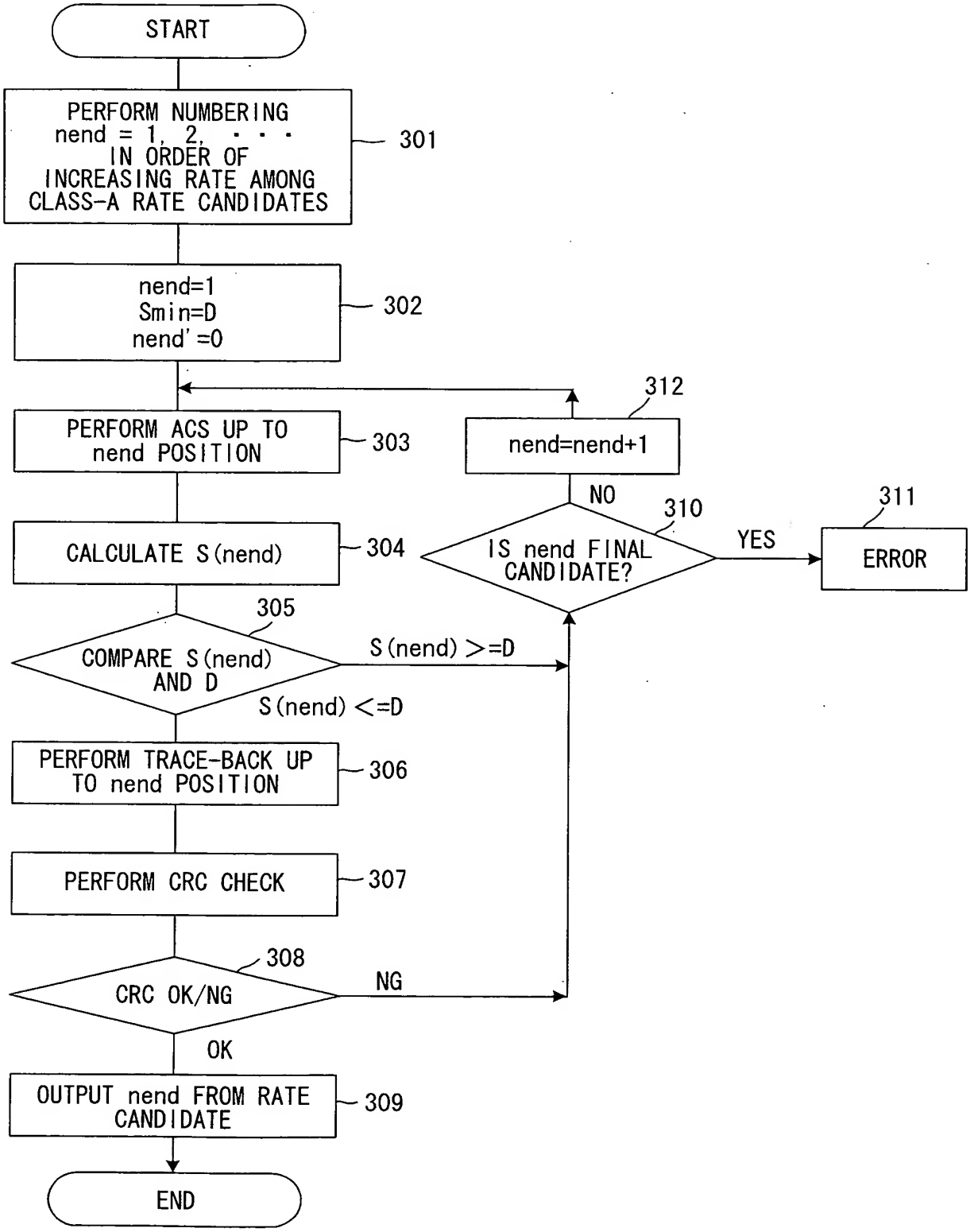

START
PERFORM NUMBERING nend = 1, 2, ・・・ IN ORDER OF INCREASING RATE AMONG CLASS-A RATE CANDIDATES
301
nend=1 Smin=D nend'=0
302
PERFORM ACS UP TO nend POSITION
303
CALCULATE S(nend)
304
COMPARE S(nend) AND D
305
S(nend) >=D
S(nend) <=D
PERFORM TRACE-BACK UP TO nend POSITION
306
PERFORM CRC CHECK
307
CRC OK/NG
308
NG
OK
OUTPUT nend FROM RATE CANDIDATE
309
END
312
nend=nend+1
NO
IS nend FINAL CANDIDATE?
310
YES
311
ERROR

FIG. 7

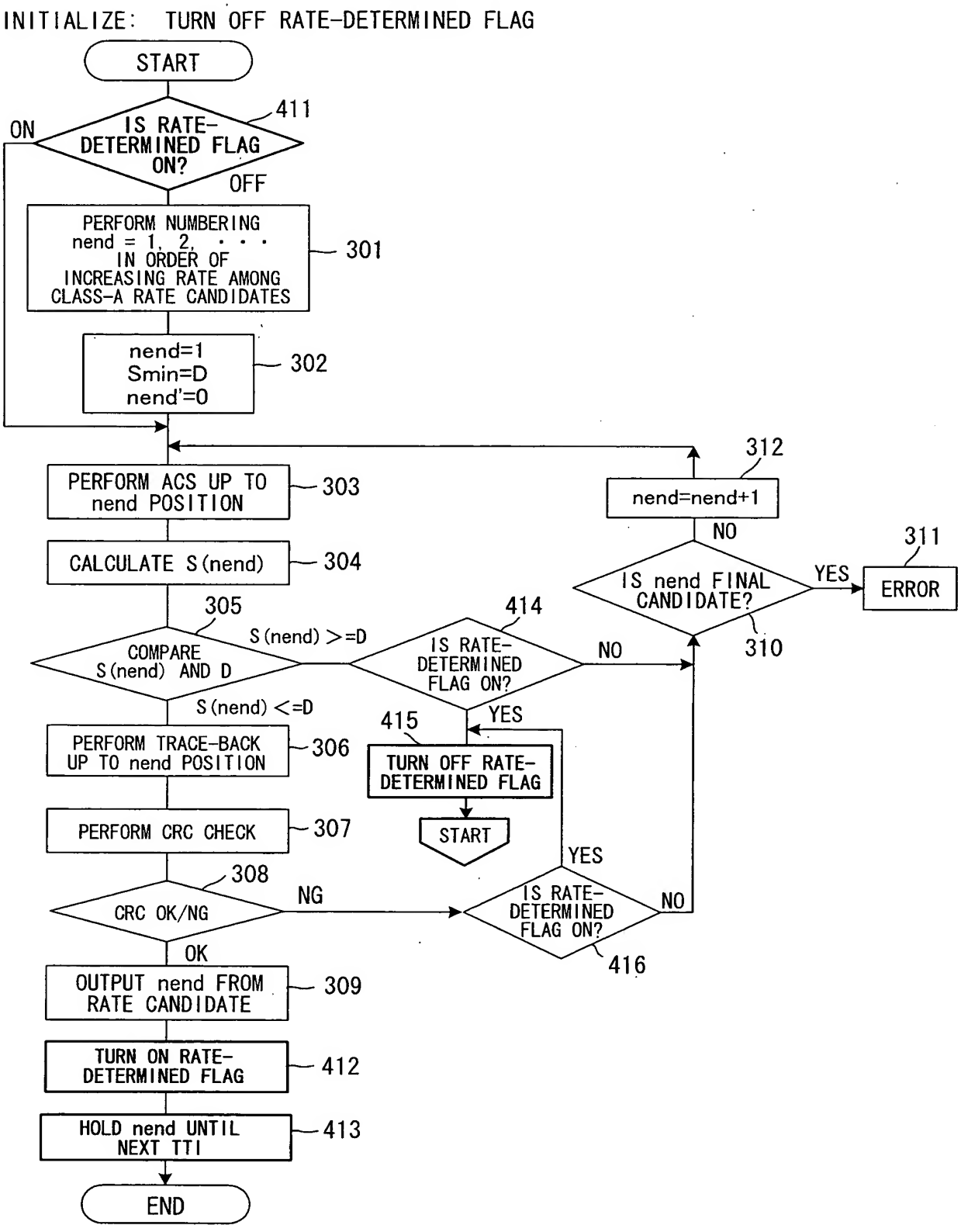

INITIALIZE: TURN OFF RATE-DETERMINED FLAG
START
411
IS RATE-DETERMINED FLAG ON?
ON
OFF
PERFORM NUMBERING nend = 1, 2, • • • IN ORDER OF INCREASING RATE AMONG CLASS-A RATE CANDIDATES
301
nend=1 Smin=D nend'=0
302
PERFORM ACS UP TO nend POSITION
303
CALCULATE S(nend)
304
305
COMPARE S(nend) AND D
S(nend) >=D
S(nend) <=D
414
IS RATE-DETERMINED FLAG ON?
NO
YES
415
TURN OFF RATE-DETERMINED FLAG
START
PERFORM TRACE-BACK UP TO nend POSITION
306
PERFORM CRC CHECK
307
308
CRC OK/NG
NG
OK
YES
IS RATE-DETERMINED FLAG ON?
NO
416
OUTPUT nend FROM RATE CANDIDATE
309
TURN ON RATE-DETERMINED FLAG
412
HOLD nend UNTIL NEXT TTI
413
END
312
nend=nend+1
NO
IS nend FINAL CANDIDATE?
YES
310
311
ERROR

FIG. 8

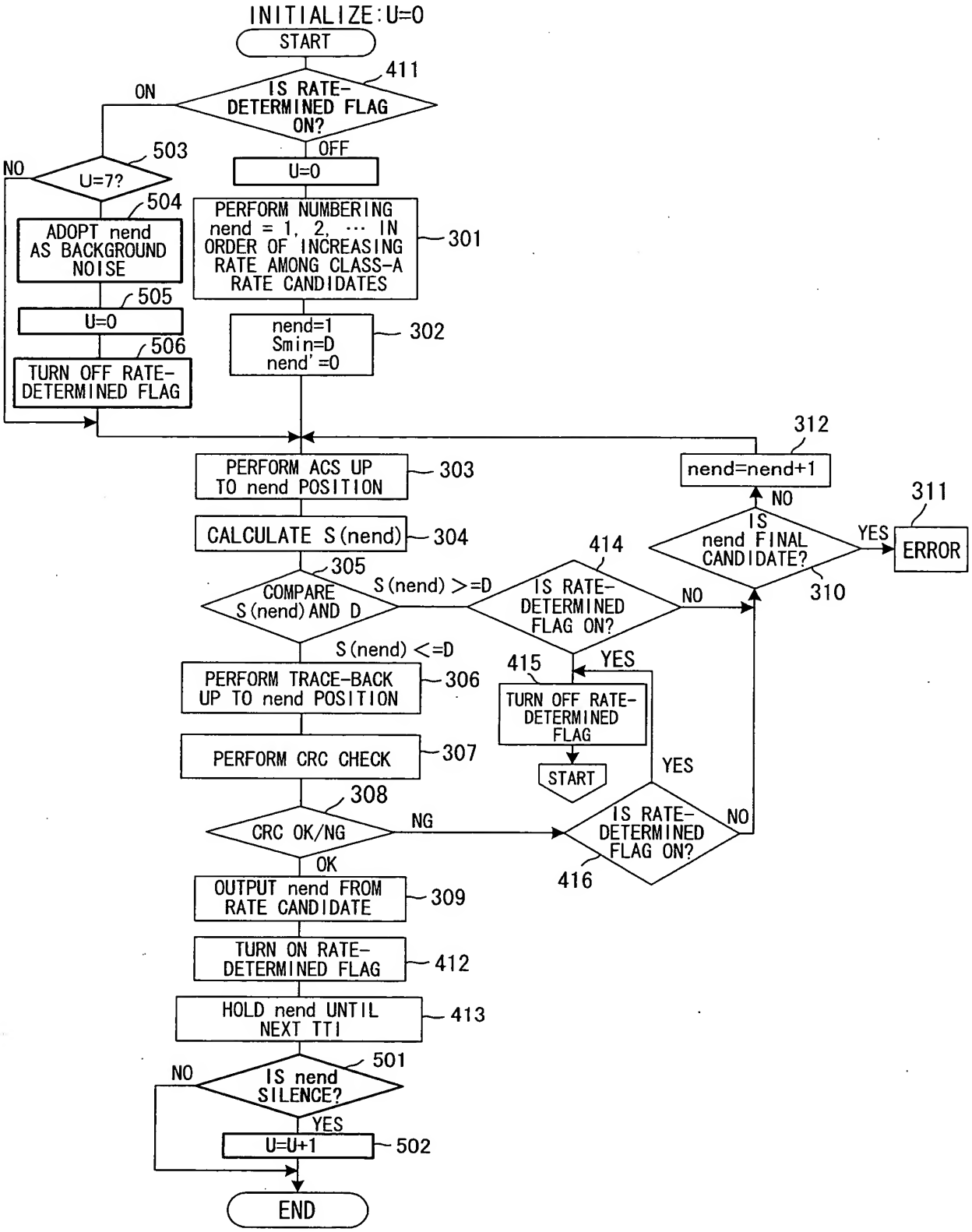

INITIALIZE:U=0
START
411
IS RATE-DETERMINED FLAG ON?
ON
OFF
503
U=7?
NO
U=0
504
ADOPT nend AS BACKGROUND NOISE
PERFORM NUMBERING nend = 1, 2, ··· IN ORDER OF INCREASING RATE AMONG CLASS-A RATE CANDIDATES
301
505
U=0
nend=1
Smin=D
nend'=0
302
506
TURN OFF RATE-DETERMINED FLAG
312
nend=nend+1
PERFORM ACS UP TO nend POSITION
303
NO
311
IS nend FINAL CANDIDATE?
YES
ERROR
CALCULATE S(nend)
304
414
310
305
COMPARE S(nend) AND D
S(nend) >=D
IS RATE-DETERMINED FLAG ON?
NO
S(nend) <=D
YES
415
PERFORM TRACE-BACK UP TO nend POSITION
306
TURN OFF RATE-DETERMINED FLAG
START
PERFORM CRC CHECK
307
YES
308
CRC OK/NG
NG
IS RATE-DETERMINED FLAG ON?
NO
416
OK
OUTPUT nend FROM RATE CANDIDATE
309
TURN ON RATE-DETERMINED FLAG
412
HOLD nend UNTIL NEXT TTI
413
501
NO
IS nend SILENCE?
YES
U=U+1
502
END

FIG. 9 PRIOR ART

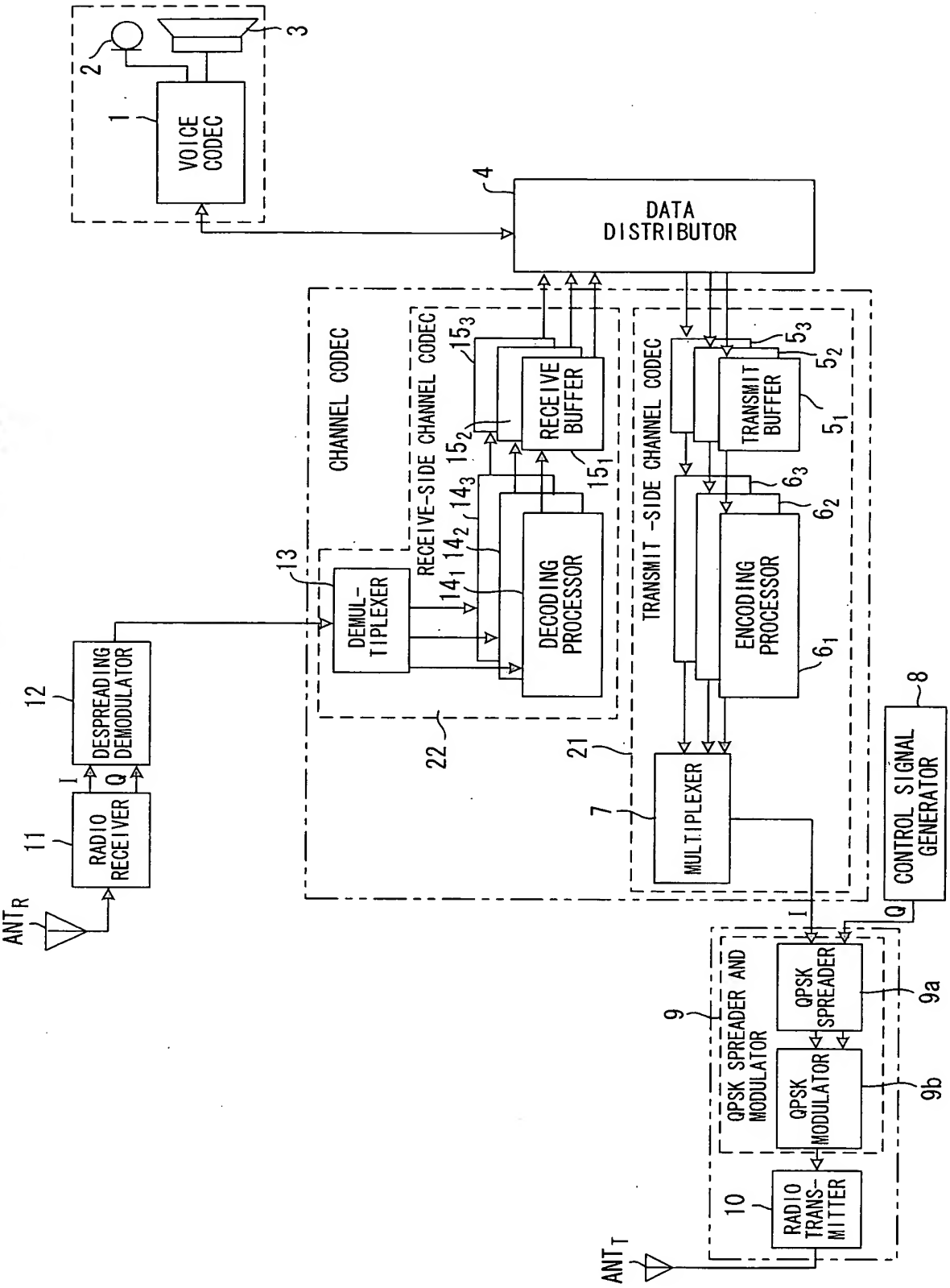


FIG. 10 PRIOR ART

FRAME TYPE	CLASS A (bit)	CLASS B (bit)	CLASS C (bit)	REMARKS
0000	42	53	0	4.75Kbps
1000	49	54	0	5.15Kbps
0100	55	63	0	5.90Kbps
1100	58	76	0	6.70Kbps
0010	61	87	0	7.40Kbps
1010	75	84	0	7.95Kbps
0110	65	99	40	10.2Kbps
1110	81	103	60	12.2Kbps
0001	39	0	0	GSM_Amr_Comfort_ Noise_frame (BACKGROUND NOISE)
1111	0	0	0	No Transmission/ Reception(SILENCE)

FIG. 11 PRIOR ART

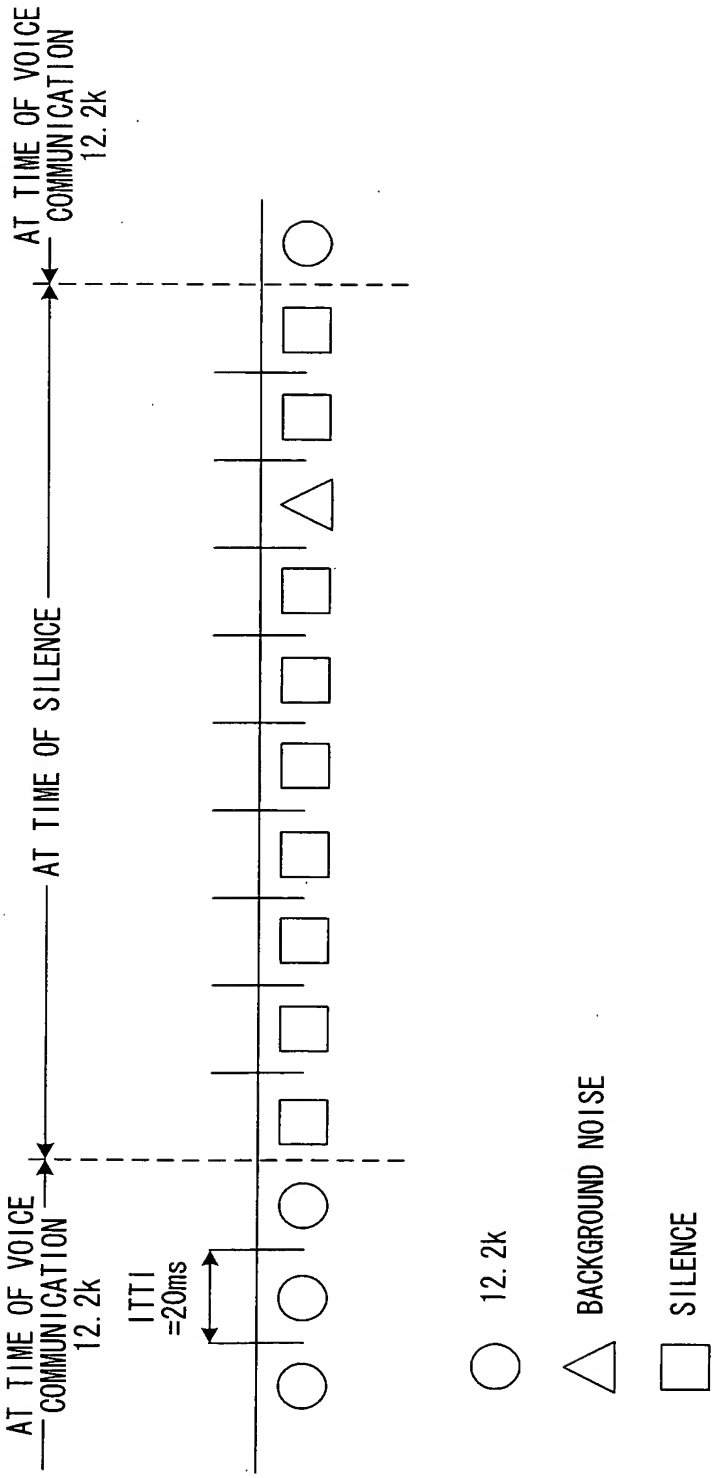


FIG. 12 PRIOR ART

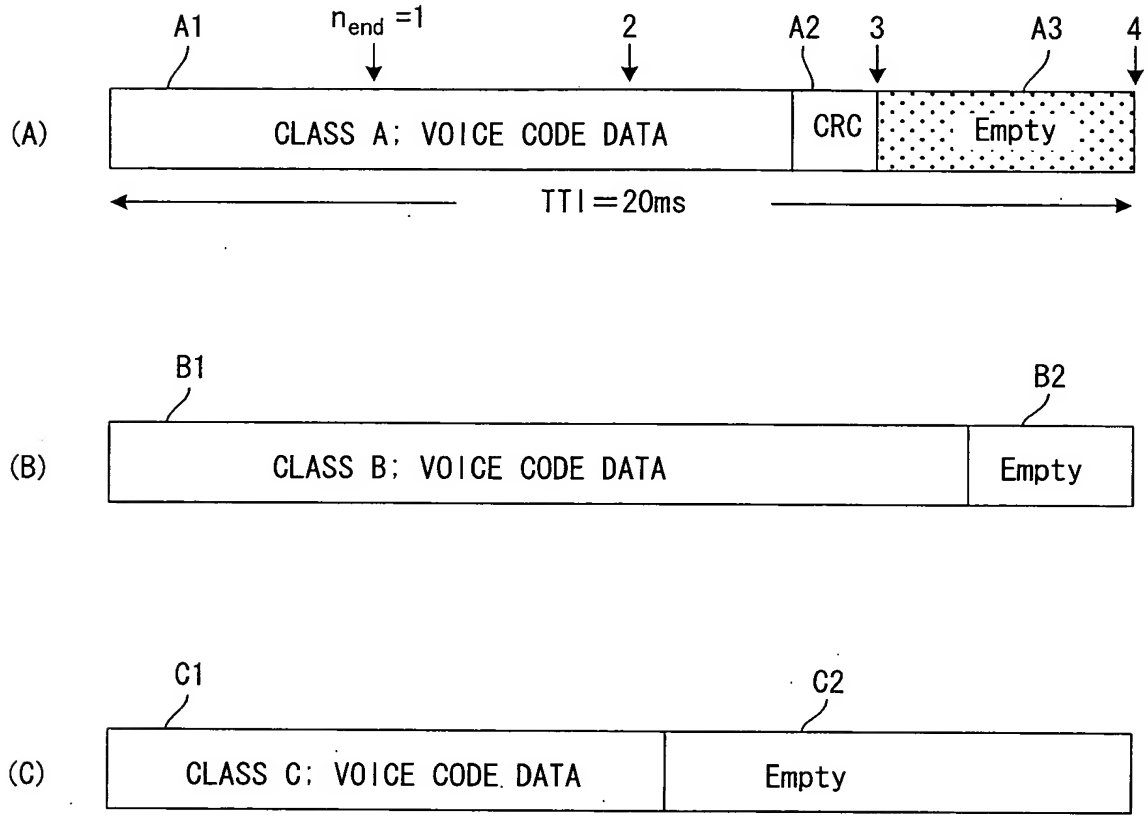


FIG. 13 PRIOR ART

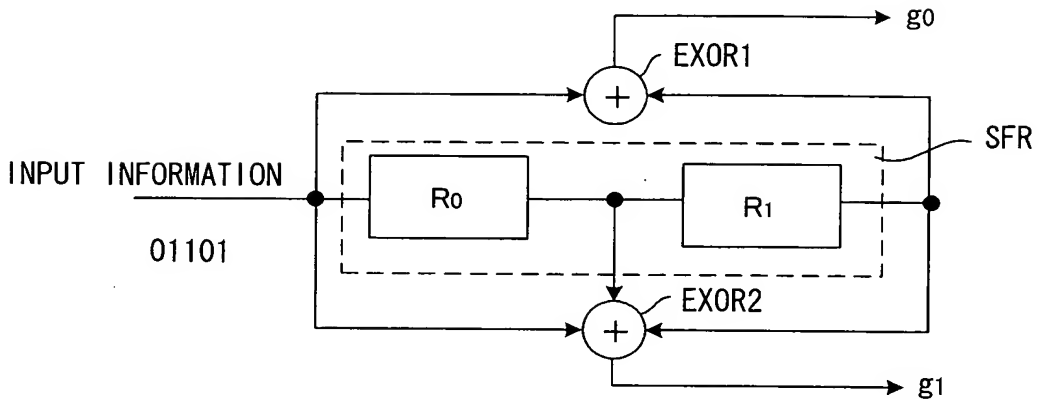


FIG. 14 PRIOR ART

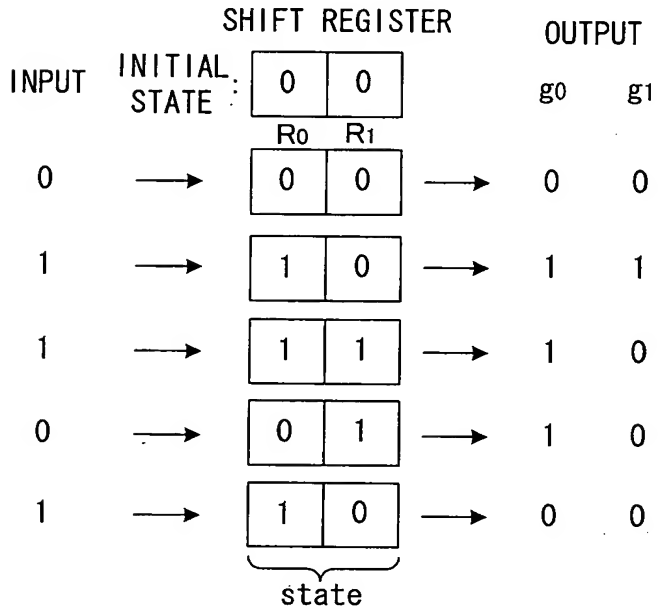


FIG. 15 PRIOR ART

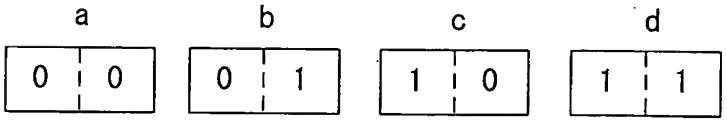


FIG. 16 PRIOR ART

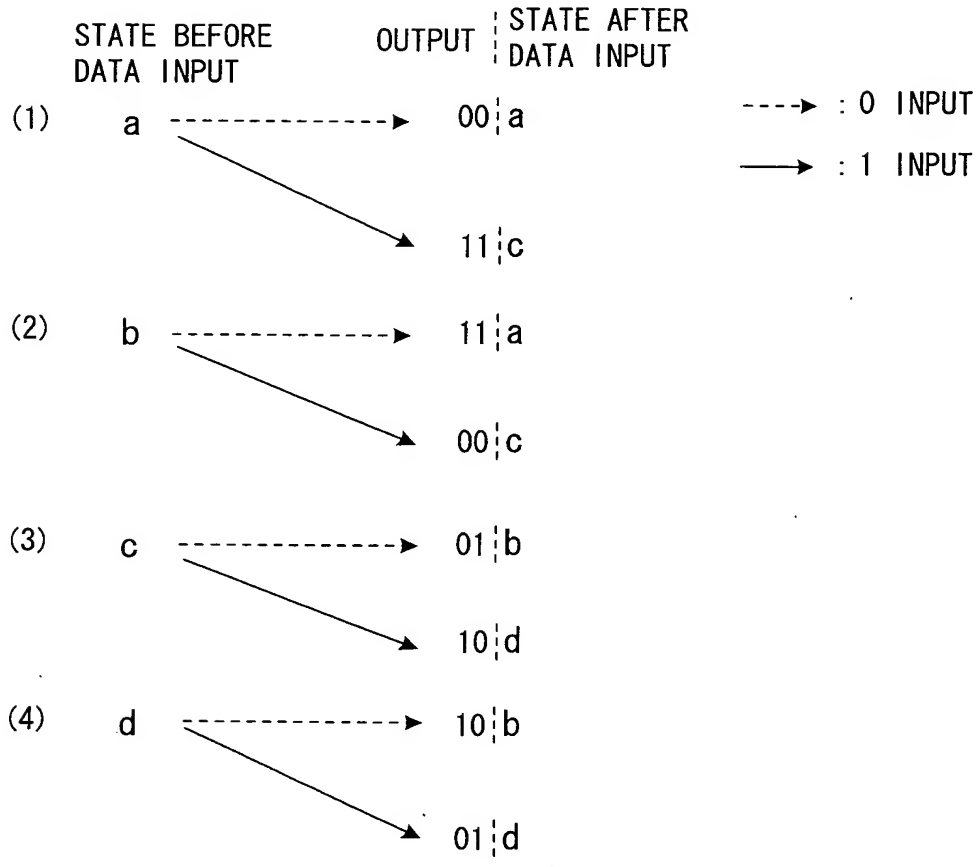


FIG. 17 PRIOR ART

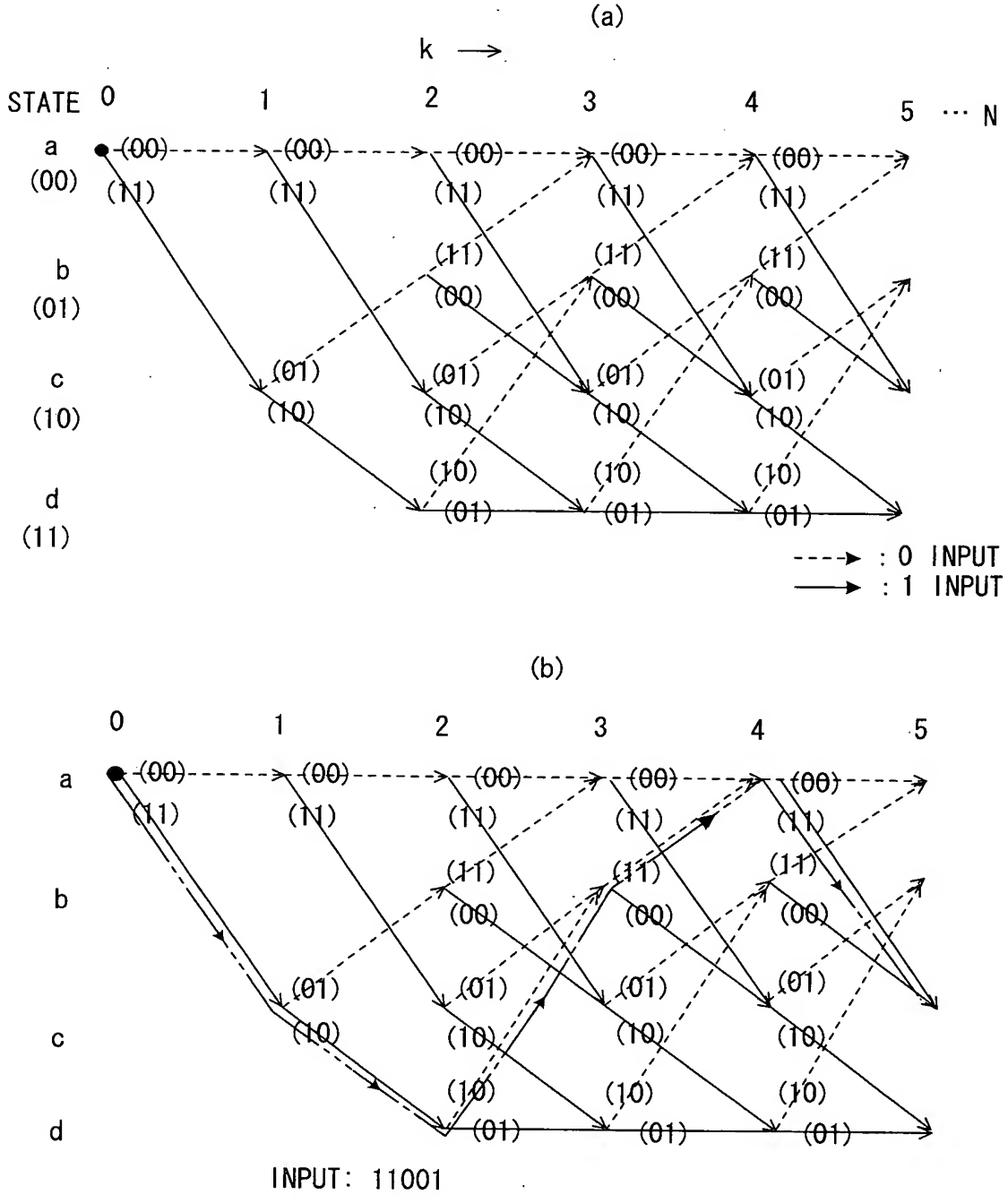
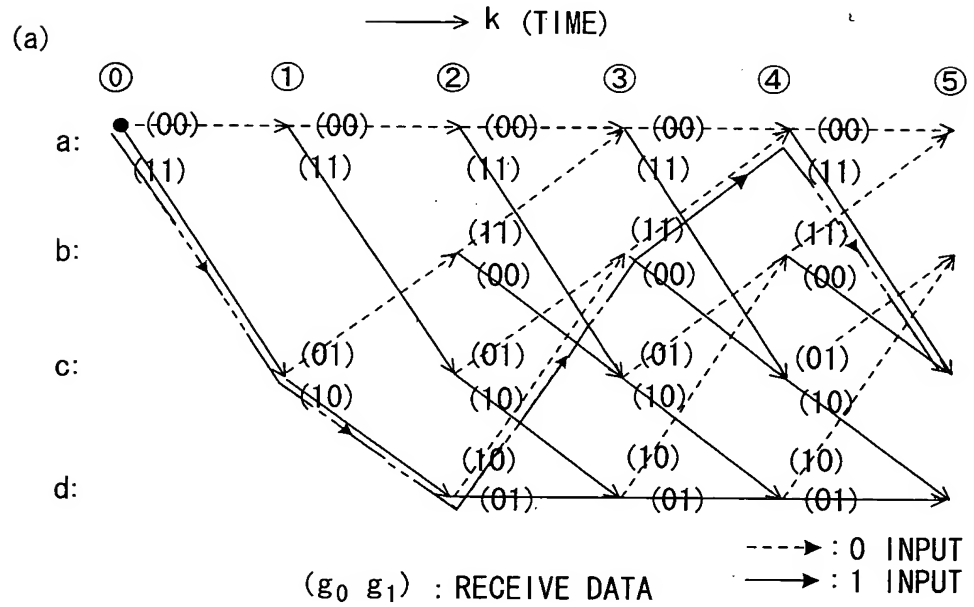


FIG. 18 PRIOR ART



(b)

	⓪	①	②	③	④	⑤
RECEIVE DATA :	1 1	1 0	1 0	1 1	1 1	
DECODED RESULT :	1	1	0	0	1	

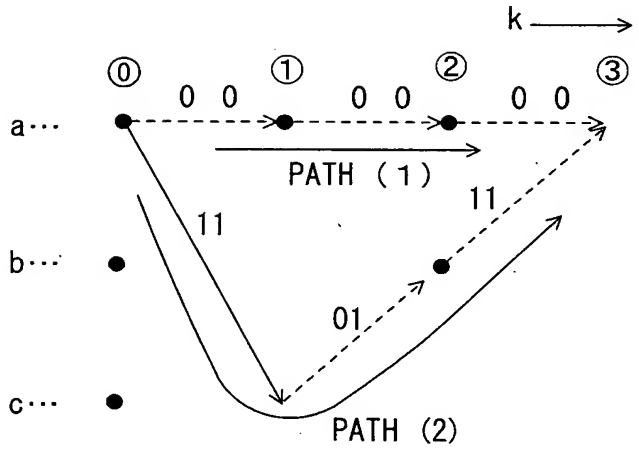
(c)

ERROR

	⓪	①	②	③	④	⑤	
RECEIVE DATA :	1 1	1 0	0 0	1 1	1 1		
DECODED RESULT :	1	1	0	0	1		ERROR COUNT = 1
			1	0	0		ERROR COUNT = 2
				0	1		ERROR COUNT = 4
				1	0		ERROR COUNT = 3
					1		ERROR COUNT = 3

FIG. 19 PRIOR ART

(a)



(b)

1	1	1	0	0	0	-----	RECEIVE DATA A
0	0	0	0	0	0		DATA OUTPUT B ASSUMING PATH (1)
1	1	1	0	0	0	-----	A ⊕ B

∴ PATH METRIC VALUE = 3

(c)

1	1	1	0	0	0	-----	RECEIVE DATA A
1	1	0	1	1	1	-----	DATA OUTPUT B ASSUMING PATH (2)
0	0	1	1	1	1	-----	A ⊕ B

∴ PATH METRIC VALUE = 4

FIG. 20 PRIOR ART

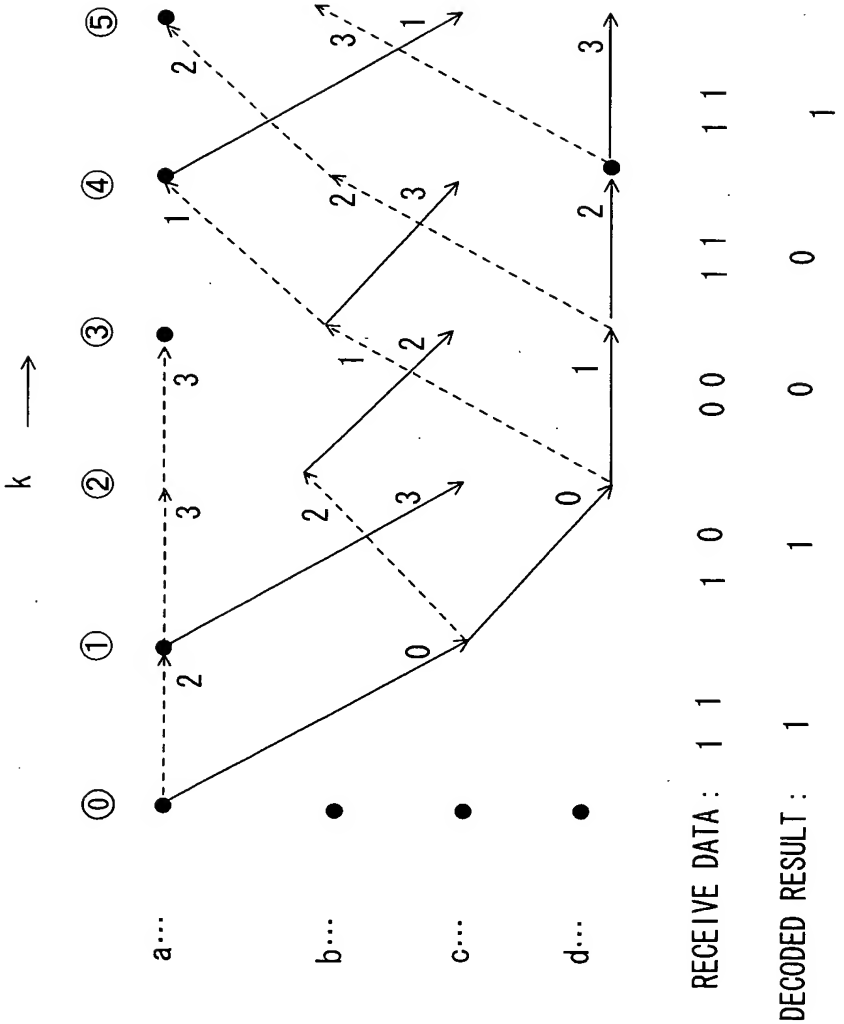


FIG. 21 PRIOR ART

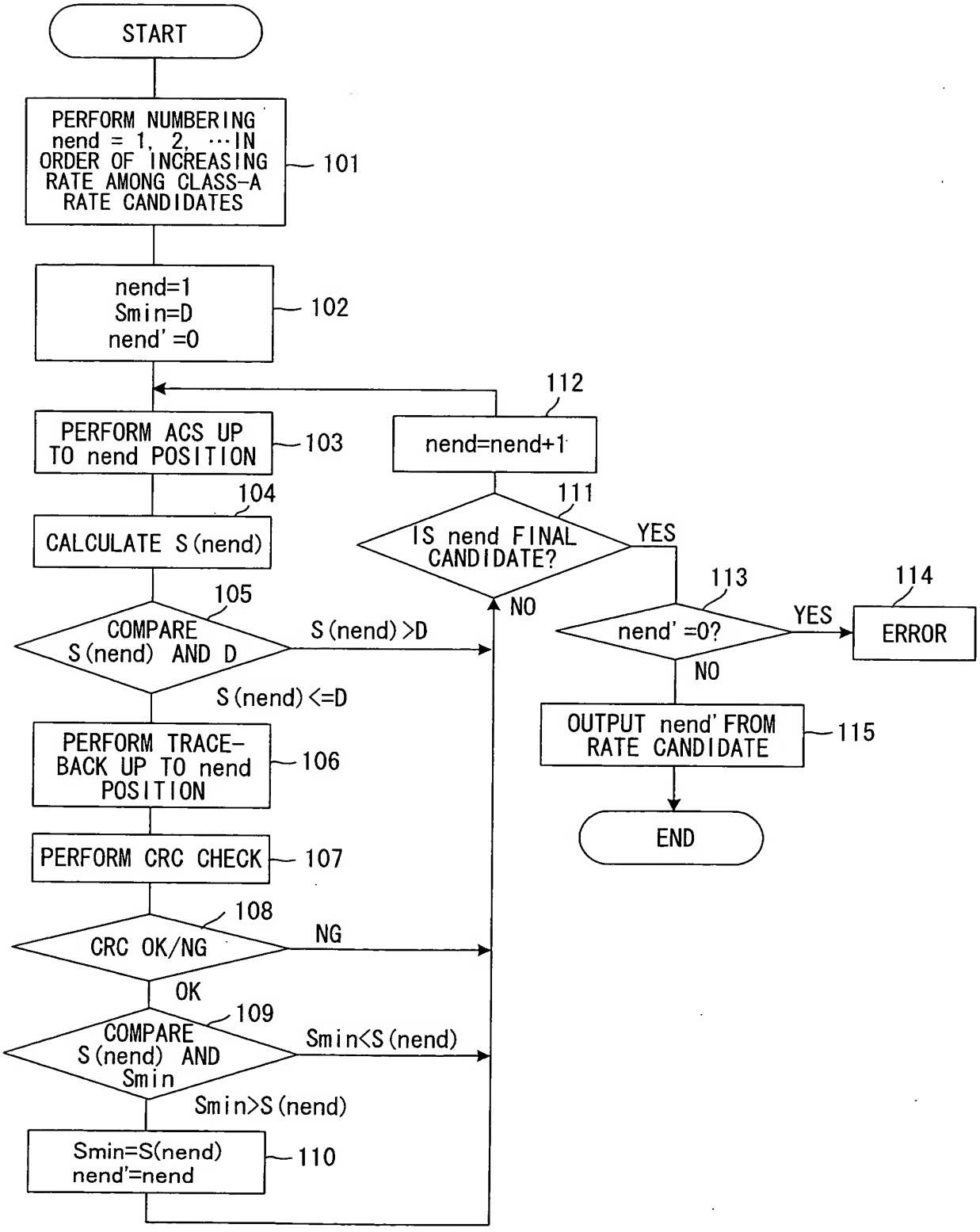
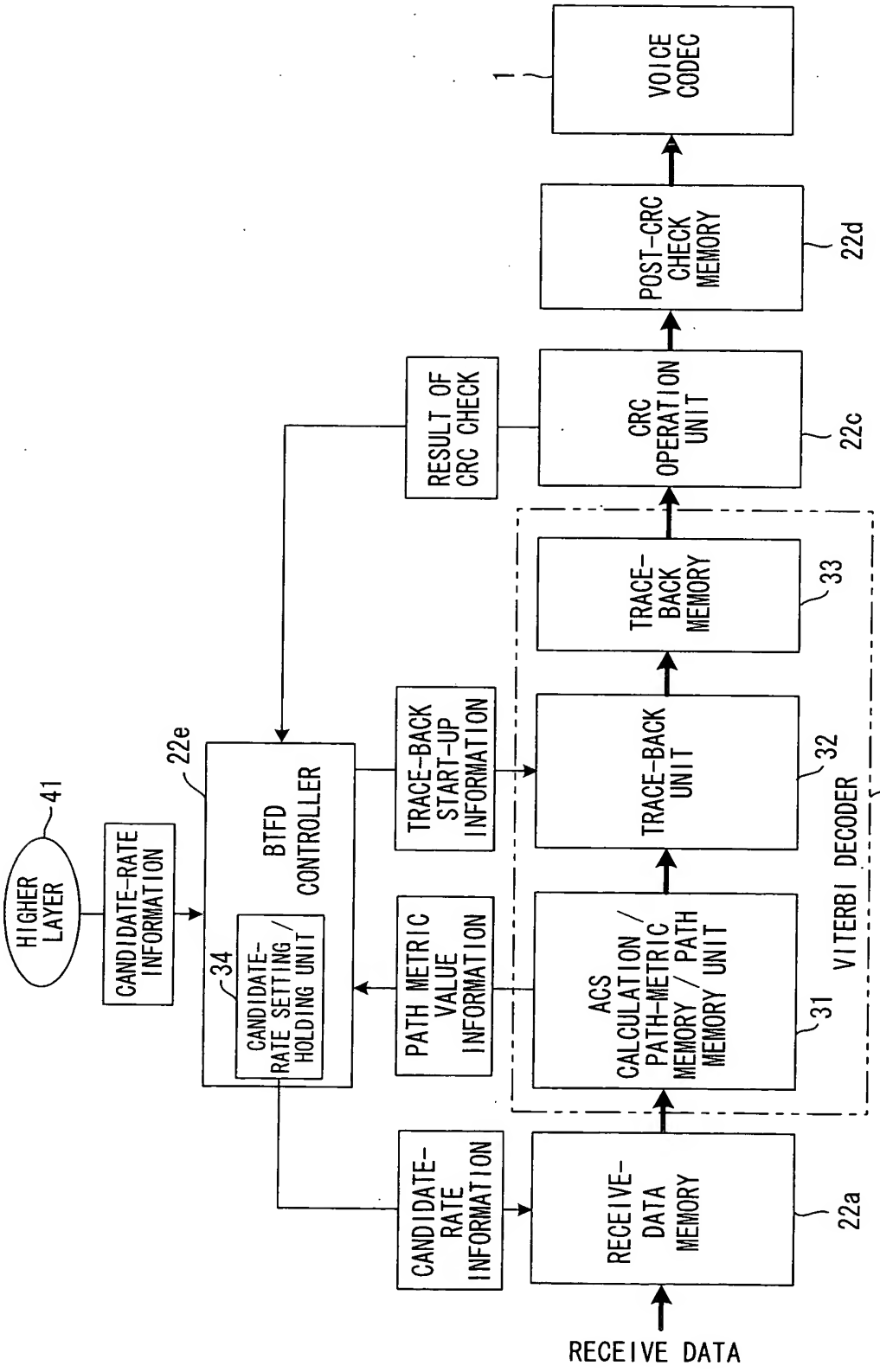



FIG. 22 PRIOR ART